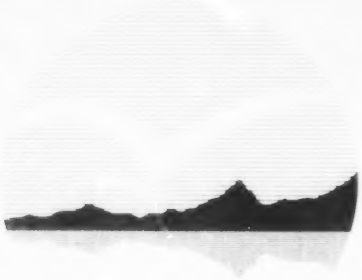
Environment Canada
Water Resources Branch
Saskatchewan District

Environnement Canada
Direction des ressources en eau
Saskatchewan District

Canada



WATER RESOURCES BRANCH

SASKATCHEWAN DISTRICT

AN ASSESSMENT OF CLIENT SERVICES AND DATA PUBLICATIONS

An Assessment of Client Services

and

Data Publications

Prepared by: RBG-H20 Co. Ltd.

Under Contract to:

Water Resources Branch
Saskatchewan District

November, 1989

90-02435/

EXECUTIVE SUMMARY

This report, which was prepared under contract by RBG-H20 Company Ltd., evaluates client satisfaction with the data and information services provided by the Water Resources Branch - Saskatchewan District. The evaluation included a subjective look at the value of WRB's data publication series, how new technologies for distributing WRB's data are being accepted, what additional data and information would be useful, and how clients rate the quality of the service being provided by WRB-Saskatchewan District.

The results of the interviews with 44 clients in Saskatchewan indicate that:

i. most of the clients interviewed were aware of all six publications.

ii. the most widely used publication is the Historical Streamflow Summary

iii. a reference index of surface water and sediment data will always be required and must be published in a printed form.

iv. the annual surface water data publication is used extensively by a number of clients involved in technical design and project evaluation.

v. the user base for microfiche and computerized data options is limited to the larger clients.

vi. in general, the users of water quantity data in Saskatchewan are satisfied with the existing publication policy.

vii. the need for real-time data during flood and drought events was increasing.

viii. a number of improvements to the publications are needed; such as improving the quality of print, publishing a 24 hour maximum flow and showing monthly values as a volume.

ix. contributed data of lower quality be published and archived by WRB.

x. a need exists for information on time-of-travel between gauging stations and an estimation of the frequency of occurrence for a particular event.

The report concludes that the level of service provided by the WRB-Saskatchewan District is very good.

TABLE OF CONTENTS

	PAGE
INTRODUCTION.....	1
HYDROMETRIC DATA - IS IT USED.....	3
RECOMMENDATIONS.....	15
APPENDIX - INTERVIEWS WITH CONCERNED AGENCIES.....	17

INTRODUCTION

The consultant has recently completed a report entitled "Saskatchewan Hydrometric Network Evaluation Study". This report was prepared for the Coordinating Committee of the Canada-Saskatchewan Memorandum of Agreement for Water Quantity Surveys. Of the forty-eight Saskatchewan based government agencies that were interviewed to determine their hydrometric needs, forty commented on the publications of the WRB (Water Resources Branch). The Saskatchewan Water Resources Branch of Environment Canada office has asked the consultant to gather these comments into one report for Environment Canada. The previously completed interviews were enhanced by gathering additional information from Prairie Provinces Water Board and Saskatchewan Power Corporation personnel and by interviewing four "representative" consultant engineering firms. The consultant also took the opportunity to add some comments based on his personal experience with the WRB and their publications.

This report answers four questions:

1. Are the users aware of the types of publication available and are the publications needed? There are six printed reports published on a continuing basis by Environment Canada. They are:

    a. Surface Water Data - Saskatchewan (published annually)
    b. Sediment Data - Saskatchewan (published annually)
    c. Historical Streamflow Summary - Saskatchewan (published in even years)
    d. Historical Water Levels Summary - Saskatchewan (published in odd years)

e. Surface Water Data Reference Index - Canada (Published in even years)

f. Sediment Data Reference Index - Canada (Published in even years)

The Saskatchewan WRB office also supplies microfiche copies of the Saskatchewan data and a computerized version of the complete historical records. Do these media serve a useful role?

2. Are the users satisfied with the present publication policies of Environment Canada? Are the publications sufficiently comprehensive?

3. Should there be any changes to the format now used to present hydrometric information to users in Saskatchewan? What additional information should be added to these publications to make them more effective.

4. How do users in Saskatchewan rate the level of service provided by the Water Resources Branch of Environment Canada?

These questions are dealt with individually in the following section entitled "Summary of Interviews". The information gathered during the interview process is also listed in the appendix at the end of this report.

HYDROMETRIC DATA - IS IT USED?

The people being interviewed as part of the Hydrometric Network Study were asked two questions directly related to this study:

1. Do you use any of the hydrometric data now being produced by the Water Resources Branch of Environment Canada? If you do, how much is used and what form do you use it in?

2. Is the data acceptable in its present form? Do you rely primarily on paper publications, microfiche copies or computer generated basic data?

Forty of the 48 people being interviewed gave answers that related directly to this study. It was deemed advisable to also ask a representative selection of consultants how they viewed the present reporting methods. This was done in the week of April 24, 1989. The relevant information from the 44 interviews has been documented in the appendix attached to this report. It includes, in some cases, comments that were omitted from the Hydrometric Network Report because they did not pertain to that report.

QUESTION ONE

Are the users aware of the types of publication available and are the publications needed? There are six printed reports published on a continuing basis by Environment Canada. They are:

a. Surface Water Data - Saskatchewan (published annually)
b. Sediment Data - Saskatchewan (published annually)

c. Historical Streamflow Summary - Saskatchewan (published in even years)
d. Historical Water Levels Summary - Saskatchewan (published in odd years)
e. Surface Water Data Reference Index - Canada (Published in even years)
f. Sediment Data Reference Index - Canada (Published in even years)

The Saskatchewan WRB office also supplies microfiche copies of the Saskatchewan data and a computerized version of the complete historical records. Do these media serve a useful role?

Most of the people contacted were aware of all six publications. Some users were not aware of the Sedimentation publications because they had never had any need to access them and none of the people interviewed expressed a strong desire to maintain them. For instance, all four of the consultants contacted were aware of their existence but only one had an occasion to refer directly to these publications and that reference was several years ago. In spite of this general lack of interest, it was generally agreed that the basic data should be gathered and stored so it can be accessed when needed. In Saskatchewan, current sedimentation requirements could be served by a reference index that shows where the information can be obtained.

The other four documents were all used to some extent. The Surface Water Data Reference Index is needed to document the hydrometric stations that are being, and have been, monitored. That type of information will always be required in printed form for any type of reference system employed in future years.

The most widely used publication is the Historical Streamflow Summary. The six regional managers of the Saskatchewan Water Corporation were unanimous in noting its usefulness both in the office and in meeting with potential

clients. They also noted that this publication could be used to describe the variability of streamflow, the overall potential of the basin at that point and the flood potential based on the flood summaries in the book. Smaller offices find this report invaluable because they can refer directly to the figures for water supply studies, etc. In many cases they do not have access to microfiche readers or the computer programming needed to use the computer summaries. It was stated by Mr. Banga (interview No.36) that this report is the most critically important publication of the three reports containing hydrometric data.

The Historical Water Levels Summary of surface waters in Saskatchewan is used from time to time but is not as well known as the historic streamflow volume. The last historical water level summary was published in 1985 and some users, like Mr. Kitchen (Interview No.23) expressed concern that the volume might have been discontinued. WRB has since received the 1987 summary report and it has been circulated to Mr. Kitchen.

The Annual Publication of Surface Water Data in Saskatchewan is used extensively by some agencies. The PFRA (Prairie Farm Rehabilitation Administration) Hydrology Division, for instance reports that its volumes of both the historical summaries and the annual data are used until they are tattered and dog-eared. There is no doubt that, for these intensive users, this publication is necessary and should be retained. Mr. Banga (Interview No.36) suggests a compromise. If economies of publication are critical, the annual publication might be discontinued and the historical publication updated every two years. Some of the detail contained in the annual

publication could be added to the historical streamflow and lake level summaries or to the reference index.

The people that use the annual publication form a much smaller but more intensive group, technically, than those that refer to the historical volumes but if this volume was discontinued it would deprive several of the people in this more intensive group of their primary data base. In some cases, they may have access to the microfiche or computerized versions of the data. Others would not be as fortunate and would have to rely on some other method of obtaining the basic data.

The microfiche and computerized data options are used by some of the larger and more intensive data users but they have not achieved wide-spread acceptance in Saskatchewan hydrologic study groups. The reasons are varied. For some, the increased expenditure to duplicate processed data that can be obtained from either the Saskatchewan Water Corporation, PFRA or Environment Canada is not cost effective. The Saskatchewan Water Corporation, in particular, is doing a good job in supplying clients with this data and these clients do not need to establish their own hydrology group . For others it is a problem of not having the equipment or software to effectively use more advanced techniques and some feel no need to change from a user system that works effectively in its present form.

QUESTION TWO

Are the users satisfied with the present publication policies of Environment Canada? Are the publications sufficiently comprehensive?

The users of hydrometric data in Saskatchewan are satisfied with the way that data is being presented to the consumer. They use the publications prepared by Environment Canada, particularly the Historical Streamflow Summaries, and would like to see this service continued. If the service was terminated, many of the people that now rely on this hydrometric data would be left without any direct access to the records of the Water Resource Branch. Some of those left without access would include agencies that now contribute data to these publications.

One concern expressed by several people, Mr. Chen (Interview No.1) and Mr. Fairley (Interview No.35) for example was the period of time taken to publish these documents. Because they are not published until over a year after the measurements are completed, they are only of historical interest. If measurable improvement could be achieved in this area, it would be appreciated.

The computerized copies of hydrometric data are used less extensively than hard-copy information because of the hardware and software needed to access them for study purposes but they do have a place in the distribution of hydrometric data. Mr. Fairbairn (Interview No.2) noted that there are two types of basic user, the technician and the manager. The managers need the printed copies, the technicians, the ones using the data in a more intense

format, need the computerized version. A similar problem exists with the microfiche copies of data. Users that do not have a microfiche reader can not use the data and, if their needs are not intensive, they will not purchase a reader to utilize the microfiche files.

Several users, Mr. O'Brien (Interview No.11), Mr. Moser (Interview No.31) and Mr. Olson (Interview No.34) for instance, noted that more real-time data was needed during critical flood or drought periods. The maximum value of hydrometric information gathered for water management purposes can not be realized unless measurements made by field staff are reported to the managers responsible for the projects that are affected by, or affect, those measurements.

The type of coordination needed should be verbal (by telephone) and written. It should include reporting of measurements of critical discharges, lake levels etc. WRB staff, in dealing historically with these types of requests, have always been cooperative in furnishing information when requested but it is stressed that this type of information exchange should be exchanged on a continuing basis, not just by request.

Another variation of real-time data distribution was suggested by Mr. Moser (Interview No.31), Mr. Debecke (Interview No.42) and others. They proposed that a continuing linkage be established with the WRB offices by having a 24 hour answering service that could be interrogated to obtain information on individual gauging stations. Both the historical data, via computer, and the current measurements and changes could be accessed through

this telephone link. Mr. Boals subsequently noted that data are available via computer linkages on a real-time basis. It is possible that this information has not been adequately communicated to all data users or that the regional offices such as that operated by Mr. Moser do not have the proper facilities to tie into such a linkage.

QUESTION THREE

Should there be any changes to the format now used to present hydrometric information to users in Saskatchewan? What additional information should be added to these publications to make them more effective?

The users of published hydrometric data in Saskatchewan are comfortable with the arrangements now in place to distribute data and see no need to change them. The accessability to published data is good and the cooperation of the WRB in making that data available to users in published hard-copy, microfiche or computerized format is appreciated by the many agencies with whom they deal.

There were several suggestions for improvement and/or revision to the existing hard-copy publications. They are as follows:

A. The print used in all publication is too small and is difficult to read. This problem has been noted by several users but is accepted as a "fact-of-life". it is not reasonable to assume that the print style used, or the size reduction chosen can not be improved. The consultant notes that the number "8" can be mis-read as a "B", a "9" or a "3" if the lighting is not perfect. The problem is compounded when copies are made

using xerox or telex-copying machines and the original clarity of print is reduced. Consideration should be given to using a larger print size and to investigating the feasibility of selecting a print style that is more distinctive to minimize the probability of misreading numbers and letters.

B. The Historical Streamflow Summaries would be more useful if monthly and mean discharge were shown in cubic decametres instead of cubic metres per second. These publications are used for water supply study purposes and the discharge figures must be transferred into volumetric figures before they can be utilized. The problem was noted by Mr. Chen (Interview No.1), Mr. Wyngaarden (Interview No.21), Mr. Wheatley (Interview No.22) and Mr. Pentland (Interview No.41).

C. Some of the people interviewed noted that it would be helpful, both in the annual volumes and the historical summaries, if 24 hour maximum flows were published. These values (the maximum average flow occurring annually over a consecutive 24 hour period) can be abstracted from recorder charts. They are used, with instantaneous peak discharges for the same time period, to analyze peak flows and peak flow volumes. There may be a problem in supplying this extra data because recorder charts were not digitized until 1970 but, in the opinion of the people needing these data, the time would be well spent.

D. Mr. Kitchen (Interview No.23) felt that more information on water elevations related to discharge should be made available to users. He

cited the North Saskatchewan River as an example and pointed out that it would help their water management capabilities if they had access to the stage related to discharge at key locations on this major interprovincial river. There is a danger in supplying this information in printed form. Users might be tempted to use that data to interpret stage-discharge curves without realizing the many factors that are considered by WRB staff in determining streamflow-stage relationships throughout the year. It may be that the information could be supplied more effectively on a need-to-know basis to individuals.

E. Mr. Banga (Interview No.36), Mr Martin (Interview No.9), Mr. Fairbairn (Interview No.3) and others expressed concern that worthwhile data is being gathered but not published by WRB. It is realized that some lake level information and streamflow information are below the usual standards of the WRB publication guidelines but it is also realized that history can not be duplicated once the event has past. There are several important sets of data that are not being retained by the WRB because of their desire to maintain a quality product in their published data. The answer to this difficult problem may be to use some alternate publication format. It could be clearly stated that these records were contributed data of lower quality. They could be isolated in a separate section of the reports or even published in a separate report but it is important that they be published and retained in a national data bank of hydrometric data. If such data was added to the microfiche and computerized data bases, it could be labelled in the files as being contributed data of lower quality. If this is not done they will only

survive in an agency's files until some person decides to "clean up the mess by throwing away that useless pile of data".

F. The Water Resources Branch regularly publishes two maps covering the three prairie provinces and showing, respectively, the active and inactive hydrometric stations. The drainage areas shown on these maps are not accurate and PFRA has accurately plotted the drainage areas for most of this area. It is suggested that the maps be revised to show the correct drainage areas by revising these areas to comply with those delineated by PFRA. It is realized that these areas are considered by WRB staff to be "administrative divisions" only but they look like drainage areas and are assumed to be drainage areas by some data users.

There were two additional suggestions that dealt with interpretation of the hydrometric data for other purposes. They are presented as follows:

I. Mr. Fast (Interview No.8) and Mr. Duncan (Interview No.20) suggested that more information be obtained on time-of-travel between gauging stations. These values are needed in determining how long it will take pollutants or water released for balancing purposes to reach the downstream hydrometric station or impact point. No suggestions were made on how this item could be documented but the need was expressed.

II. Mr. Moser (Interview No.31) would like to see, in the historical summary, an estimated frequency of occurrence shown for some specific

higher-than-average and lower-than-average years. They believe that their clients would be able to associate specific years of flooding and/or drought with anticipated frequencies. The client would then have a better concept of the degree of protection offered by projects designed for the 1:10, 1:25 or 1:50 level of flooding. Initial reactions to this suggestion were positive but there are several pitfalls involved. What frequency distribution will be used to define frequency? How negative will be the reaction of lay people when they see the frequency of an individual flood event change every two years when new data becomes available. Furthermore, how negative will their reaction be when a larger flood or drought occurs than any that have been previously experience and the field staff representative has to tell them that they "just changed the rules" on frequency values. It would seem to be an impractical solution to a difficult problem.

QUESTION FOUR

How do users in Saskatchewan rate the level of service provided by the Water Resources Branch of Environment Canada?

The people and agencies needing the services of the Water Resources Branch in Saskatchewan were unanimous in their praise of the agency's attitudes on providing help to satisfy their needs. The cooperation of the Data Control Supervisor, in particular, was noted. Mr. Heinze's help was noted by several of the users interviewed. He took the time to find out why they wanted the information and supplied them with all of the information

needed, including the name of other agencies or people when applicable, as opposed to only giving them the individual pieces of paper they had requested.

The same attitude of cooperation was noted at several levels of the WRB office but some concern was expressed by field officers of the Saskatchewan Water Corporation that the WRB field staff did not always provide SASK WATER field staff with real-time data during critical drought or flood periods (Interview No.31). This misunderstanding appears to be an example of a communication breakdown between two water resource agencies, or possibly between office and field staff, because the headquarters staff of the Saskatchewan Water Corporation has no such problems.

RECOMMENDATIONS

Some recommendation can be made by the consultant based on the above information.

IT IS RECOMMENDED THAT:

A. The following four hard-copy publications of the WRB be continued because they are used and needed by Saskatchewan users;

Surface Water Data - Saskatchewan (published annually)
Historical Streamflow Summary - Saskatchewan (published in even years)
Historical Water Levels Summary - Saskatchewan (published in odd years)
Surface Water Data Reference Index - Canada (published in even years)

B. Consideration be given to terminating publication of the annual Sediment Data-Saskatchewan and the Historical Reference Index and to publishing listings of available sediment data stations in the Historic Streamflow Summary or in the Surface Water Data Reference Index.

C. The format used to print hard-copy publication be reviewed to increase readability and useability.

D. Environment Canada consider the feasibility of revising their publication format to include hydrometric data with lower standards to ensure that these historic hydrometric records are retained and made available to the hydrologic community.

E. Several other suggestions have been made to increase the usefulness of the hard-copy publications (see question 3). These suggestions should be reviewed and, where feasible, implemented.

F. Environment Canada recognize that both hard-copy publication and computerized records of hydrometric data are necessary to keep all users informed.

G. The present methods of supplying information to users in Saskatchewan be continued. They are effectively supplying the people and agencies that use this hydrometric data.

H. Environment Canada revise their existing drainage boundaries, as shown on their key maps to reflect the more accurate delineations made by PFRA.

APPENDIX

INTERVIEWS WITH CONCERNED AGENCIES

1. A.J. Chen, Operations Engineer, Prairie Provinces Water Board

Board staff are familiar with the hard-copy documents produced by WRB. They use the two historical summaries for study purposes and usually do not refer to annual summaries. The sedimentation documents are not used. The Historical Lake Level Summaries would be more helpful if end-of-month lake levels were shown instead of, or in addition to, average monthly lake levels. The end-of-month information could be used to determine the change in storage during a month in both reservoirs and natural lakes, a basic necessity for water supply studies.

The present frequency of publication is more than adequate. Mr. Chen suggested that once in five years would serve the needs of the PPWB. The data needed for annual flow balances is obtained directly from the WRB long before either the annual or historical volumes are published. The Board staff also uses the computerized data base supplied by WRB but does not utilize the microfiche file because they do not have microfiche readers.

There is one additional publication that causes some confusion among hydrologists. The index map of the three prairie provinces shows inaccurate drainage areas. These should be revised to match the drainage areas delineated by PFRA. The PFRA set of drainage areas is acceptable to all three provinces and by the federal agencies working with water resources in the prairie environment.

The print used in producing WRB reports is small and hard to read. The index at the back of the Reference Index is a good example. These lists are almost unreadable unless you use a magnifying glass. The service provided in supplying data for apportionment service and in answering specific requests is excellent and Board staff have no complaints concerning this area.

---

2. R.G. Boals, Chief, Water Resources Branch, Saskatchewan, Environment Canada

The WRB maintains the hydrometric network used to assess water resources in Saskatchewan and must react both to existing needs and to future requirements. The classical hard-copy annual and historical summaries, microfiche files and computerized data banks can all be made available. There are also specialized requirements related to accessing real-time data, gathering coverage on specific storm events and information related to the morphological, geologic and geographic nature of the drainage basins.

---

3. D.J. Fairbairn, Head, Planning Division, Water Planning and Management, Western and Northern Region, Environment Canada

The annual and historical summary volumes are needed and should be continued. The computerized output is also needed for the user that wants to study the information is more detail and has access to computers. Two types of user were identified: the manager that needs the type of quick, reliable estimates of streamflow that can be obtained from the hard-copy publications and the technician who uses computerized file to analyze the hydrometric information for more precise detailed hydrometric studies.

The high data standards maintained in accepting data for publication lead to problems in retaining valuable water-management information. There should be some way to also publish the less precise, but important, observational data gathered when that information is needed by water-management groups. Useful data has been gathered in programs now operated by agencies like PFRA and SASK WATER that is not published because it is "below the acceptable standards of WRB". That data could be preserved permanently if it was incorporated into the existing data base. Concerns about lower quality data could be met be labelling the data as lower quality information collected by co-operating agencies.

---

4. W.D. Gummer, Chief, Water Quality Branch, Western and Northern Region, Environment Canada

The existing publication provide adequate hydrometric data for the water-quality monitoring program. If water quality analysis is conducted on a real-time basis at some future time, real-time hydrometric information will be required to complement it. That possibility is not an immediate concern.

It may be that the WRB is too concerned with creating a usable historical record of streamflow and not enough concerned with reacting to the type of immediate problems related to water-quality personnel.

---

5. L. Ward, Principal Engineer, Electric Planning, Sask. Power Corporation

Mr. Ward is aware of, and has used, the annual surface water, historical streamflow, historical lake level and reference index publications and is satisfied with the degree of technical detail in all four publications. His group also refers to the microfiche copies when they want more detail on streamflow in the South Saskatchewan river but most of their simulations and forecasts are based on the printed publications.

The level of service, both in supplying printed volumes and in answering individual requests is good and there are no suggestions for improvement. The layout of information is adequate but the print itself is difficult to read. The correct values can always be determined by carefully examining the text but the need to double-check numbers like 8 and 9 is both time consuming and frustrating.

---

6. A.R. Iverson, Ducks Unlimited Canada

Ducks Unlimited uses historic records of streamflow at long-term stations to estimate the amount of water that would be available on a continuing basis to each project. In Saskatchewan, from 60 to 80 projects are reviewed in an average year and about half of these are rejected before being forwarded to SASK WATER. The hydrometric data base is obtained from annual and historical summary publications and these are needed if these studies are to be continued. The technicians involved do not have access to either microfiche readers or computers and must rely on the hard-copy publications.

---

7. K.A. Birch, Director, Electric Transmission Operations, Sask. Power Corp.

Mr. Birch's group uses the paper publications of WRB to support their work but does not refer to either the microfiche or computerized data. They are not and intensive user of data but periodically access the data base for checking and operational purposes. The material and service from WRB are fully satisfactory and Mr. Birch noted that he was pleasantly surprised at the level of detail achieved in these publications.

---

8. D. Fast, Director, Water Quality Branch, Sask. Dept. of Environment

The Branch uses published hydrometric information to check minimum flows and other historical data but relies upon SASK WATER to supply any interpretive studies. The computerized data files have been accessed by this group and computer access would be an acceptable way of gathering the hydrometric information they require. The information would be even more acceptable if it could be readily accessed by telephone.

The lack of information on time-of-travel in streams is a problem that makes it harder for the Branch to do its work. The time for a spill to reach a downstream site is critical and the data now found in hydrometric data files does not relate streamflow to anticipated time of travel under variable discharge conditions.

---

9. F.R.J.Martin, Manager, Hydrology Division, PFRA (Prairie Farm Rehabilitation Administration)

The Hydrology division staff uses all three forms of data: hard-copy publications, microfiche files and computerized data. Some evidence of the frequency of uses is that the annual and historical publications are tattered an dog-eared and the binding is coming apart. The historical summaries have literally been worn out. Paper publications, in Mr. Martin's opinion are critical to the successful operation of this division and should be continued in their present form and frequency of publication. He also feels that there is a continuing use for both the microfiche files and the computerized data base and both of these files are used extensively in his division.

The level of service provided by WRB staff is fully satisfactory and he particularly noted the cooperative and helpful attitudes of the Data Control Supervisor. Some problems have been experienced with the small, hard to read, type styles used but the overall publication format is very effective.

---

10. R. Baldwin, Field Manager, Soil and Conservation Service, PFRA

Mr. Baldwin stated that his service was a secondary user of the basic dat processed in the Hydrology Division. They do, however, use the historical summary volumes and are satisfied with the level of detail provided.

---

11. E.G. O'Brien, Drought Analyst, Policy and Analysis Service, PFRA

Mr O'Brien refers to the annual streamflow publications and the historical summaries on a need-to-know basis. He is satisfied with the level of detail presented but noted that he would like to see more accurate and more intensive real-time data being made available from WRB personnel. This would include informing PFRA of measurements taken during critical periods and reporting more regularly on streamflow conditions during severe flood or drought periods. He suggested that more liaison was needed between WRB field staff and the people that use their data to forecast drought and flood.

---

12. G. Wetterstrand, Acting Chief of Technical Services, PFRA

The technical services of PFRA rely upon their Hydrology Division to supply information related to hydrologic data. there are some minor exceptions where staff will refer directly to the hydrometric publications but most information is gathered through the Division and this fully satisfactory arrangement will be continued. No difficulties with the present publication format were identified but it was specifically noted that being able to refer directly to a printed record made their job easier.

---

13. B.T.Abrahamson, Chief, Planning Service, PFRA

The Planning Branch relies upon the Hydrology Division to supply most of their hydrologic information but the summary books of historical data are often used to prepare preliminary estimates for proposed projects. This use would only be related to the initial reconnaissance phase of the study.

---

14. G.W. Pepper, Manager, Integrated Policy Unit, Sask. Parks,Rec. and Culture

The department is not a direct user of hydrometric data but they occasionally use the annual and historical publications to prepare preliminary or background information on some study situations. The degree of detail contained in these publications is adequate for their purposes.

---

15. R.F. Hopkinson, Prairie Hydrometeorologist, AES, Environment Canada

Mr. Hopkinson uses water level data from Lake Diefenbaker and Middle Creek Reservoir in ongoing evaporation studies. He also refers periodically to the published annual and historical summaries of hydrometric data. He would also be able to utilize either microfiche files or computerized data banks if necessary. The degree of detail in the published reports is fully adequate for his purposes.

---

16. G. Nieminen, Manager, Environmental Engineering Division, City of Regina

The only use presently being made of the existing hydrometric network is to check the streamflow of Wascana Creek to estimate the degree to which sewage being discharged into Wascana Creek below Regina is assimilated.

---

17. L. Talbot, Director, Community Planning and Dev. Services, Sask. Rural Dev.

The department occasionally uses some of the hydrometric records but, for the most part, relies upon SASK WATER and/or consultants for both data and data interpretations. The present level of detail in the annual and historical summaries is more than adequate for their purposes.

---

18. E.A. Anderson, Executive Director, Trans. Services Div., Sask. Rural Dev.

The hydrometric books and the microfiche files are used on a continuing basis and it would be very inconvenient to have to rely solely on computerized output. the historical summaries are particularly useful because they can be utilized at meetings with the public. The present level of detail is adequate.

---

19. B. Patterson, Director, Maintenance and Development, Wascana Centre Authority

Wascana Centre personnel do not regularly use the data produced by WRB but they do have special needs related to the Centre's operation and they regularly read the automatic gauge on Wascana Lake to keep a record of the lake's levels.

---

20. W.G.Duncan, Regional Manager, Southwest Region, SASK-WATER

Extensive use is made of hydrometric data for management of existing projects including real-time data on basins like the Frenchman River basin where the level of irrigation development creates continuing problems in balancing and allocating water use. More information on time-of-travel, channel losses and tributary streamflow downstream from Val Marie would help to make this task easier.

The printed records of hydrometric data are used extensively. Other records, microfiche and computerized files, are not used due in part to a lack of the equipment needed to view or duplicate microfiche. The use of computerized data would appear to be counter-productive because any detailed manipulation of the historical records is done by the Hydrology Service of SASK WATER. Very little data manipulation is undertaken by the Regional office.

---

21. N. Wyngaarden, Regional Hydrologist, East Central Region, SASK-WATER

The East-Central Region has a hydrologist on staff that does many of the studies for the region. He uses the printed records, microfiche and the computerized records regularly and is generally satisfied with the format used in the existing documents and files.

One other type of information that would be useful would be instantaneous, 24 hour maximum and mean daily flood peaks for both summer storms and annual peaks.

---

22. J.R. Wheatley, Regional Manager, Northeast Region, SASK-WATER

The service provided by the WRB is good where retrieval of historic data is concerned. It would be more helpful if the computerized version was supplied on a floppy disk that could be used with a micro-computer of the type available to the Region. The Region uses the following hydrometric data:

a. Annual Peaks-daily mean	used continually	fiche and publications
-instantaneous	used occasionally	fiche and publications
b. Daily Flows (other than peaks)	used occasionally	fiche
c. Mean Monthly Flows	used regularly	fiche and publications
d. Annual Discharge	used regularly	fiche and publications
e. Daily Lake Levels	used occasionally	fiche
f. Monthly Mean Lake Levels	used occasionally	fiche and publications

The format used to present data is acceptable but, in publishing historical data, it would be more effective if monthly flows were published as volumes rather than streamflows. The delay from the time data is gathered until it is published is long but the WRB is very cooperative in providing preliminary data when requested.

---

23. R.F. Kitchen, Regional Manager, Northwest Region, SASK-WATER

Hydrologic problems requiring detailed analysis are normally referred to the Hydrology Service of SASK WATER. The direct use made of hydrometric data in the region is usually limited to reference to the paper publications of WRB. These are adequate but here are some problems related to format. For instance, in the historical summary volumes the monthly records would be more usable if they were shown as volumes rather than rates of flow. Occasionally the computer data is accessed when dealing with North Saskatchewan River flows but most use is related directly to using monthly flow data from the annual and historical publications.

More stage information on river discharges should be made available for all stations. It would be used to analyze flood control and drainage projects. Excellent cooperation is given by WRB personnel in Regina when this information is requested but it would be more effective if the data was available when needed.

If records could be accessed more readily it would also help in the analysis stage. It was noted that some water level data recorded by SASK WATER is not published and it would help if everyone knew that the information was available. For instance, records have been kept since 1986 on Lac la Plonge, Iroquois Lake, Meeting Lake and Pierce Lake and records were taken on Martens Lake in 1988. The records taken on 18 other lakes in the region are published by WRB.

---

24. R. Monk, Assistant Manager, Water Pollution Control Department, Saskatoon

The City makes occasional use of historical records for future planning purposes. They also keep track of announcements made by SASK WATER concerning releases above the minimum flow levels. They do not need an increased level of hydrometric information and have no problems with the existing data.

---

25. A.Y. Fagnou, Design Engineer, City of Saskatoon

The City of Saskatoon uses the telemark station on the South Saskatchewan River, interrogating it as needed to get stage information. Historical water levels are also used to set storm sewer outfall elevations.

---

26. G. Grismer, Resource Conservation Coordinator, Meewasin Valley Authority

The Meewasin Valley Authority is administratively concerned with the South Saskatchewan River from the upper end of the Corman Park Rural Municipality downstream to the Clarksboro Ferry. Their hydrometric concerns are related, primarily, to the water level of the river and this level is checked periodically by interrogating the telemark installation in Saskatoon.

---

27. Dr. A.W. Diamond, Head, Migratory Bird Studies, Canadian Wildlife Service

WRB record are rarely used by CWS personnel. Their operation is on a project-by-project basis and most of it is involved with wetlands and marshes that are separated from rivers and creeks. Some staging grounds like the Cumberland Delta are exceptions to that rule. Because of their sporadic use of WRB data, Dr. Diamond made no comment on the format of the paper publications or the adequacy of the existing network.

---

28. B. Ireland, Regional Manager, West central Region, SASK-WATER

The regional staff regularly use some twenty hydrometric station records. These are in the Brightwater Creek, Eagle Creek, SSEWS system, Lake Diefenbaker and Opuntia Lake areas. Both historical records and real-time data are used in normal years.

The Regional office uses both microfiche records and paper publications. The historical summaries are particularly useful in dealing with clients.

---

29. J. Whiting, Saskatchewan Research Council

The Saskatchewan Research Council uses the daily, monthly and annual historical records of the WRB to analyze study areas in all of Western Canada. They use and need the paper reports and make use of the microfiche records supplied by WRB. The service, compared to that of AES, is excellent. Individual requests are answered in from one to three days.

---

30. D.K. Paddock, Manager, Northern Operations Branch, SASK-WATER

Mr. Paddock relies on the Hydrology Service in Moose Jaw for all hydrologic analysis and has little personal demand for hydrometric data. He uses the WRB publications for reference purposes and finds the level of detail fully adequate for his purposes.

---

31. A.R. Moser, Regional Manager, Southeast Region, SASK-WATER

Regional staff use the printed hydrometric data, especially the historical summary, to deal with clients complaints and conflicts and for rudimentary analysis of problems. For more detailed processing of hard data they rely on the Hydrology Service in Moose Jaw. The paper publications are essential to their working procedures and they want to retain them even if they have to pay for the publications. Uses include preliminary analysis for irrigation, municipal and domestic projects and preliminary analysis of flood risks.

The possibility of describing the frequency of specific years in the historical summary was mentioned. It would be easier to talk to clients if, when you used the summary, you could also present a statement saying that the flood in 1975 at a specific site was about a 1:50 occurrence and that the 1988 runoff was equivalent to a 1:80 drought frequency.

There are no additional real-time data requirements in the region but better access to real-time data when flood events are occurring would help to deal with ongoing needs of the regional office. It would also be useful to have access to preliminary flow measurements, lake level readings, precipitation and evaporation measurements (using a computerized linkup) for day-to-day regional operations.

---

32. J. Fox, Manager, Technical Services, SASK-WATER

The Hydrology Service provides the hydrological information used by the Technical Services for the Dam Safety Program but the Technical Services personnel occasionally makes use of the paper publications to get a general feel for the type of area being dealt with.

---

33. W.Randall, Chief Engineer, SASK-WATER

Mr. Randall occasionally refers to the paper publications showing historic streamflow but relies on the Hydrology Service for the hydrologic information needed by SASK WATER.

---

34. T. Olson, Resource Engineer, Planning Branch, SASK-WATER

Mr. Olson's comments were based both on his present situation and on past experience in the corporation. He noted that, in the southwest area of Saskatchewan, there is a need for more real-time data because the area is heavily developed and needs to be carefully and continuously managed. The annual and historical publications will always be used because of their ready availability for meetings, demonstrations, etc. As long as hydrologists have access to the hard data in computerized form, the rest of the water-resource community will rely upon them for detailed studies and use the books for more casual and preliminary reference.

---

35. B. Fairley, Acting Director, South Saskatchewan River Basin Study

Mr. Fairley makes extensive use of all types of hydrometric data including streamflow, rating curves, cross sections and lake/reservoir elevations. The data is being used to develop a framework plan for managing the basin's water resources. This involves a variety of detailed studies, including calculation of natural flows, modelling, water balances and flood routing. The hydraulic information produced through the hydrometric network has been very useful to the Basin Study and additional hydraulic information on new and proposed hydrometric stations can be utilized in a similar fashion.

The current hydrometric system meets the needs of the agencies managing the basin's water resources reasonably well. First improvements might focus on getting the data out to users faster and on supplying more real-time information. If annual and historical streamflow records were not available in bound paper form, it would represent a significant hardship to small offices not equipped to handle microfiche and computerized records. The paper copy is almost always the first and easiest form to use when dealing with streamflow questions.

The suggestion was made that the money spent monitoring streamflow is among the best money spent by the Federal Government and that the monitoring programs should be maintained and strengthened as the country's water resources become more heavily used.

---

36. A.B. Banga, Manager, Hydrology Service, SASK WATER

All of the WRB hydrometric data publications are used by the Hydrology Service of SASK-WATER. Mr. Banga described four categories of use:

1. Hydrologic Data Base- The data most frequently used were the historical monthly records, both for studies of individual projects and for basin studies. The data base is also used to document peaks, water use, etc. and to calculate natural flows.

2. Streamflow Forecasting and Operational Management- The goal is to provide streamflow forecasts and to give systems operation planning services to the province. Real-time data from DCPs and telemark installations are needed and detailed measurements are often made as part of the monitoring strategy. The measurements made by SASK WATER personnel are kept on file. Data needs are immediate for forecasting and operational purposes.

3. Interjurisdictional Water Management- the work in this area is usually done through the PPWB Committee on Hydrology. It also includes monitoring of streamflow at the international boundary between Canada and the United States of America.

4. Supplying Flow and Lake Level Information- There is an ongoing need to have information readily available for both the public and government agencies. The data needs for this service are steadily increasing and, in recent years, have included requests for winter ice thickness on lakes and rivers.

The Hydrology Service is satisfied with the current level of service provided by the WRB of Environment Canada. Mr. Banga made some comments, however, that might be used to further the usefulness of the data. He noted that the information produced by Saskatchewan agencies for local needs is often not published by the WRB because it does not meet their standards. The quality of the published data is good but a lot of useful information that might be useful to future studies is lost to other agencies and the public if they do not know where to find it in provincial files. This end result is counterproductive. Possibly, if the data was listed as being contributed data of "poor quality", the WRB designation for such material, it could also be published. The Corporation periodically publishes miscellaneous streamflow and lake level measurements but there are data that are buried in agency files that will probably be lost when the next "housecleaning" campaign occurs.

The annual and historical WRB publications are necessary and will continue to be used on a regular basis. The records most frequently used are the historical summaries. If they were published every two or three years, the annual volumes could be discontinued in Mr. Banga's opinion. Consideration might be given to ensuring that the station information contained in the annual publications were included in the historical summaries if this course of action was taken.

The computerized records have become an essential tool in the Hydrology Service. When reference is made to these records, the user can be assured that all revisions, updates and more recent information is on the record without having to phone, research or track them down in annual publications.

---

37. Dr. W. Nicholaichuk, NHRI (National Hydrology Research Institute

The present hydrometric network is used sporadically be NHRI depending upon the specific problems they are dealing with. There is a continuing need to determine that the models being utilized are consistent with ground truth as measured by hydrometric data and these data are periodically reviewed by NHRI staff.

---

38. D. Cole, Director, Wakamow Valley Authority

Mr. Cole noted that his agency uses the annual and historical WRB publications for general information on a continuing basis but has not accessed the more comprehensive computerized data for over two years. He feels that the present format used in both the annual and historic volumes is acceptable and that no changes in publication mode are required.

---

39. W. Dybvig, Chief Planner, SASK-WATER

Mr. Dybvig uses the hydrometric data network but relies upon the Hydrology Service for detailed studies. The present format used and the present distributions system is adequate for his purposes.

---

40. G. Telfer, Utility Manager, SASK-WATER

Mr. Telfer, as part of his responsibilities in managing the Saskatoon Southeast project, regularly monitors five reservoir and lake level gauges and measures discharge at six locations on the project. The data on these eleven gauging sites is forwarded to the Hydrology Service in Moose Jaw for subsequent publication. He refers, from time to time, to the historical summary of this published data. The ready accessability to this format is appreciated but the same information could be obtained from his project files.

---

41. R. Pentland, Consultant, Water Resources Consultants Limited

Mr. Pentland makes use of the annual and historical publications documenting the hydrometric data base on a continuing basis. He does not use either the microfiche or computerized data files but is aware of their existence. Generally speaking, the present format used to present hydrometrical data is satisfactory but the historical summaries would be more useful if the monthly historical records were shown as monthly volumes rather than as discharges.

The print in all of the hydrometric data publications is too small and hard to read, particularly if copies are made of the original documents. He has no other suggestions for change from the existing format and notes that the service from both office and field staff is excellent. The helpful attitudes of WRB staff have been greatly appreciated by this consultant.

---

42. W.J. Debecke, Associated Engineering (Sask.) Ltd.

Associated Engineering staff are aware of the annual, historical streamflow and historical lake level and reference index publications. They also know of the sediment publications but have only had to use it once in the last seven years. the Historical Streamflow Summary is the volume most frequently used in this consulting office and the Historical Water Level Summary is used on occasion.

The office is aware of the computerized data file maintained by WRB and routinely uses this information. They would benefit from a system that allowed continuing computer access to WRB files. The microfiche file is not used, both because a microfiche reader is not available and because the information can be obtained from the published and/or computerized files. The service given by WRB staff is rated as being good, definitely above the average of similar federal government offices.

---

43. R.C.Bower, Director, Water Resources Division, UMA Engineering Ltd

UMA does not use the computerized version of the hydrometric records because the computer link is not justified, based on the current use factors. They are aware of the six hard copy publications (annual surface water data, historical streamflow and lake level summaries, reference index and the two sedimentation publications). The sedimentation publications have not been used and the historical streamflow summary is the most frequently used publication of the six listed.

The level of detail is appropriate and appreciated. It would be helpful if additional information on flood frequency analysis and/or printouts of frequency statistics were published in these books but it is realized that this additional step might be difficult to implement. The reference material from the Saskatchewan Water Corporation is sufficiently detailed for most studies and the printed publications are usually used only to check the hydrometric base that was originally used to generate the hydrologic information. Some difficulties have been experienced in the checking process due to a combination of the small print and the print style used in the WRB publications and an improvement in readability would be appreciated.

The cooperation of the WRB staff in supplying these publications, and in reacting to special requests, is excellent. Mr Bower particularly appreciates the way in which the Data Control Supervisor makes a real effort to understand what the consultant's total needs are, rather than just supplying the pieces of paper requested.

---

44. K.P. Ducheminsky, Senior Water Resources Engineer, Cochrane Lavalin Inc.

The consultant is aware of the six hard copy publications (annual surface water data, historical streamflow and lake level summaries, reference index and the two sedimentation publications). The sedimentation publications were last used five years ago and the historical streamflow summary is the most frequently used publication of the five listed. Cochrane Lavalin does not use the computerized file because that degree of intensive data is not required but they do refer to the microfiche records as required. The existing hydrometric network and reporting sequences are adequate and they have no suggestion for any improvements to the present reporting format.

The time gap between observation and publication is a minor matter of concern to these data users. Their concerns are considerably eased by the good service supplied by WRB in responding to special request and the office should be complemented on their effectiveness.

The small print is occasionally an annoying factor to users of hard-copy publications. the correct values can always be obtained from the books by careful perusal but it is easy to misread the numbers because of the print style and the size of the published text. When a page is FAXED to another office the resulting printout is often difficult to interpret.